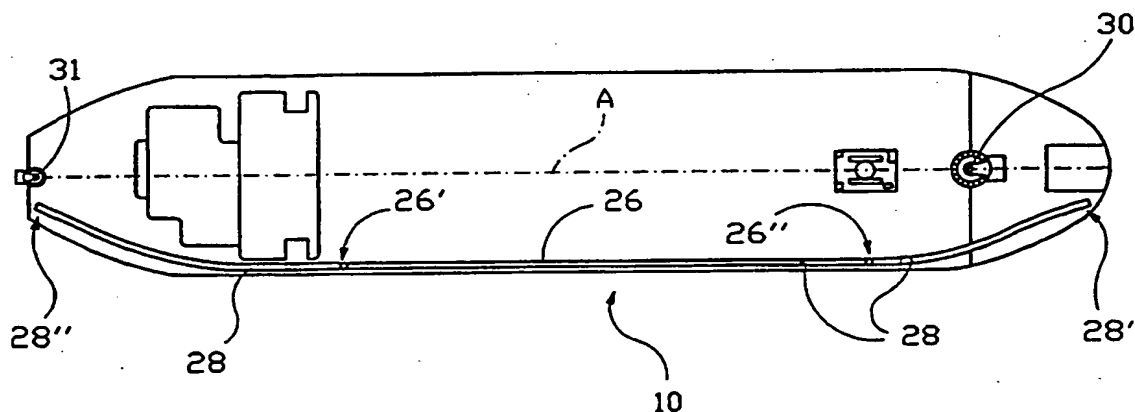


## INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification <sup>6</sup> : <b>B63B 27/30</b>	<b>A1</b>	(11) International Publication Number: <b>WO 98/32651</b> (43) International Publication Date: 30 July 1998 (30.07.98)
<p>(21) International Application Number: PCT/NO98/00019</p> <p>(22) International Filing Date: 21 January 1998 (21.01.98)</p> <p>(30) Priority Data: 970301 24 January 1997 (24.01.97) NO</p> <p>(71) Applicants (for all designated States except US): HITEC ASA [NO/NO]; Postboks 178, N-4033 Forus (NO). PGS OFFSHORE TECHNOLOGY AS [NO/NO]; Strandveien 4, N-1324 Lysaker (NO).</p> <p>(72) Inventors; and (75) Inventors/Applicants (for US only): BØRSETH, Knut, Erik [NO/NO]; Valhallaveien 85, N-1413 Tårnåsen (NO). SMEDAL, Arne [NO/NO]; Torjusholmen, N-4818 Færvik (NO).</p> <p>(74) Agents: HÅMSØ, Borge et al.; Håmsø Patentbyrå Ans, P.O. Box 171, N-4301 Sandnes (NO).</p>		<p>(81) Designated States: AL, AM, AT, AT (Utility model), AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CU, CZ, CZ (Utility model), DE, DE (Utility model), DK, DK (Utility model), EE, EE (Utility model), ES, FI, FI (Utility model), GB, GE, GH, GM, GW, HU, ID, IL, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SK (Utility model), SL, TJ, TM, TR, TT, UA, UG, US, UZ, VN, YU, ZW, ARIPO patent (GH, GM, KE, LS, MW, SD, SZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, ML, MR, NE, SN, TD, TG).</p> <p><b>Published</b> With international search report. In English translation (filed in Norwegian).</p>

(54) Title: ARRANGEMENT FOR TANKERS



## (57) Abstract

A tanker (10) is provided with at least one storage tank for the temporary storing of oil or other liquid, and with an oil/liquid transfer pipe hose system including a transfer hose (26) which may be interconnected between said tanker (10) and for example another tanker. To enable use of the same transfer hose (26) on loading/unloading both from the stern and the bows of the ship (10), the ship (10) is provided with a transfer hose (26), which extends along one side of the ship's hull, which transfer hose (26) is supported displaceable in opposite directions along its own longitudinal axis.

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### Arrangement for tankers

The present invention relates to a device by a tanker, for example in the form of a storage tanker or a production ship for use in oil production from small and minor oil fields.

- 5 However, this tanker does not have to be formed as a production ship of the type conventionally used for small, so-called marginal, oil fields, as it is sufficient that the tanker has at least one storage tank for oil or other fluid which may be transferred through a flexible hose or an resiliently flexible pipe line. In addition to the storage tank(s)  
10 the tanker shall exhibit piping to enable transfer of oil/liquid from its storage tank(s) to the storage tank of another tanker or to an installation for example on the shore.

- When the tanker according to the invention is configured as a  
15 production ship of the kind which may be moored to a so-called STL-buoy or similar device, the tanker will be provided with a first oil transfer system, at its front end configured and arranged to be connected to the pipe connection nozzle of the buoy, and leading aft, in which the outlet end of the first  
20 piping system aft may be located above the filling level of the storage tank.

An STL-buoy is a submerged buoyancy body with connection nozzle for at least one riser end, and is received in a downwards open, possibly vertically through recess in the fore part of the ship, whereby the ship may pivot on the vertical axis of the buoy, which thereby forms the mooring point of the ship, and whereby the buoy itself is held in position by means of anchors in the form of sloping hawsers anchored to the sea bed.

Tankers formed as such a production ship with mooring and oil transfer possibilities relative to said STL buoy are well known in themselves.

The tanker according to the invention may also be used as a regular cargo ship for oil from, for example, other production ships.

The tanker is provided with means for handling at least one oil transfer hose, freely suspended in use, so that other tankers or installations co-operating with the tanker shall not have to have a transfer hose of their own. This is because such hoses are partly very long and their weight and remaining unmanageability make them difficult to get into stand-by position and operating position.

The tanker according to the invention may in one important embodiment be built with a view to serving several production ships in one oil field. In such an application production ships, which are smaller than the conventional ones, may be built, as the storing capacity for oil may be provided by the tanker according to the invention.

The tanker according to the invention may thus be used as a storage tank for a production ship, or it may be used as a so-called shuttle tanker for several production ships.

The object of the present invention has been to provide a tanker of the initially mentioned kind, in which may be provided, in a simple manner, an oil/liquid transfer hose, freely suspended in use, between the stern or bows of the ship and another ship or installation.

A particular object of the present invention consists in the fact that said transfer hose from the stern or the bows of the ship may be provided by means of one hose.

According to the invention said object is realised by means of a hose or flexible pipeline arranged longitudinally displaceable onboard the tanker and constituting said oil/liquid transfer hose, and the hose being, at least partly, freely suspended, and preferably placed on a guiding extending along the side of the ship's hull.

On a shuttle tanker this transfer hose, which for example may have a length of 150 - 250 metres, could be arranged in a guiding in the form of an upwards open trough-shaped groove which extends along substantially the whole longitudinal extension of the side of the ship's hull.

A guiding or directing means for the transfer hose may alternatively have the form of a series of pivotal supporting rolls. Likewise, a possibly displaceable belt may constitute a convenient guiding for the transfer hose. Whether the transfer hose is to be pulled forwards or aft from its idle stand-by position, in which its central point may lie halfway along the ship, naturally depends on whether the transfer of oil/liquid is to take place via the bows or the stern of the ship. The tanker according to the invention will fore and aft be provided with known connecting devices, to which the one end of the longitudinally displaceable transfer hose may be connected, while the remaining part of the transfer hose is pulled across towards the other tanker or an installation for the connection of the other end.

The transfer hose may be pulled on to another vessel, a sea-based installation or another plant/installation to/from which it may be of interest to transfer oil/liquid by means of a wireline and winch, in a manner known in itself. Winches  
5 may also be applied for pulling the transfer hose in one or the other of its two intended, mutually opposite directions of pull onboard the ship in accordance with the invention. For example, a winch may be used fore and aft, preferably with vertical axis of rotation.

10 The invention will be explained in further detail in the following in connection with the non-limiting examples of preferred embodiments which have been illustrated in the accompanying schematic illustrations.

Reference is made to the drawings, in which:

- 15 Fig. 1 shows a schematic side-view of a tanker in the form of a production ship, from which the transfer of oil takes place over the stern thereof, to a tanker (for example a shuttle tanker) by the stem of the latter, and in which the production ship is moored to a submerged STL buoy;
- 20 Fig. 2 shows the tanker/production ship according to Fig. 1, seen separately in side-view/vertical longitudinal section and on a somewhat larger scale than in Fig. 1;

Fig. 3 shows a plan view of the tanker/production ship in Fig. 2, seen from above;

- 25 Fig. 4 likewise shows, in side-view/vertical longitudinal section a tanker/production ship according to the invention, in which the transfer of oil/liquid takes place to the ship according to the invention by the stem thereof, from the storage tank of another, partly shown tanker;

Fig. 5 corresponds to Fig. 4, but here is shown the transfer of oil/liquid from the storage tank of the tanker/production ship according to the invention by stern thereof, to the storage tank of another partly shown tanker.

- 5 According to Fig. 1, a tanker 10 according to the invention is configured, in a manner known in itself, as a production ship, and the production ship 10 communicates with a well head on the sea bed (not shown).

- 10 A riser 12 is connected to an STL-buoy 14 having connecting devices for the upper end of said riser 12 and for an adjacent connecting end of a fixed piping system 16 whose opposite end opens into the storage tank 18 of the ship 10.

- 15 The STL-buoy 14 is kept in the submerged position by means of anchors in the form of slopingly directed hawsers 20, 20', each secured to the buoy 14 by one end and anchored to the seabed by the other end.

- 20 The buoy 14 is conical, tapering upwards, and engages a complementary recess 22 formed in an adjacent portion of the hull structure. The device is such, that the ship 10 may turn freely about a mooring point which coincides with the vertical axis of respectively the buoy 14 and the recess 22. Fig. 1 mainly serves to show that the tanker forming the basis of the invention, may in one embodiment take the form of such a production ship 10.

- 25 A fixed piping system 24 leads from the storage tank 18 to an aft connecting end 24'. Likewise, another tanker 10a is provided with fixed piping systems 16a leading from a storage tank (not shown) to a connecting end 24a' at the bows.

- 30 Between the aft connecting end 24' of the production ship 10 and for example a connecting end 24a' of another tanker 10a,

there is need for a pipeline in the form of a freely suspended, depending hose 26 whose ends are arranged to enable liquidtight connection to said connecting ends 24' and 24a' of the two ships 10, 10a.

- 5 Said ships in combination with such an elongated oil/liquid transfer hose are what forms the basis of the invention.

According to the present invention, Fig. 3, such an oil/liquid transfer hose 26 is provided in an extended, substantially straight-line stand-by position alongside the  
10 ship. The transfer hose 26 is defined in each axial end by a pipe coupling 26', 26". Each of these pipe couplings 26' and 26" is arranged for liquidtight connection to respectively the connections 16', 24' of the ship itself, or to the ship/installation to or from which oil/liquid is to be trans-  
15 ferred.

According to Fig. 3 the transfer hose 26 is placed in a guiding, which can take the form of a much elongated, upwards open trough 28. The trough 28 for the hose 26 extends along one side of the ship, right to the vicinity of the bows or  
20 the stern, the trough ends being defined by the reference numerals 28' and 28", respectively. Of course, the transfer hose 26 may extend along the axis A of the ship 10.

A hose 28 thus arranged along the side of the ship, may easily be moved to the bows or stern of the ship, for example by  
25 means of winch operated 30, 31 wirelines or in another convenient manner. When one hose end 26' or 26" has been pulled to the bows or stern area, it is pulled further on to the ship 10a or to an installation (not shown) in a manner known in itself, for example by means of a winch and wireline from  
30 the ship 10a.



- The trough 28 according to the embodiment shown in Fig. 3 may form both a bed and a guiding, and in its bottom portion it may perhaps be provided with an underlying roller conveyor comprising a major number of successive rollers or wheels.
- 5 Other supporting structures, such as for example conveyor belts, may be used.

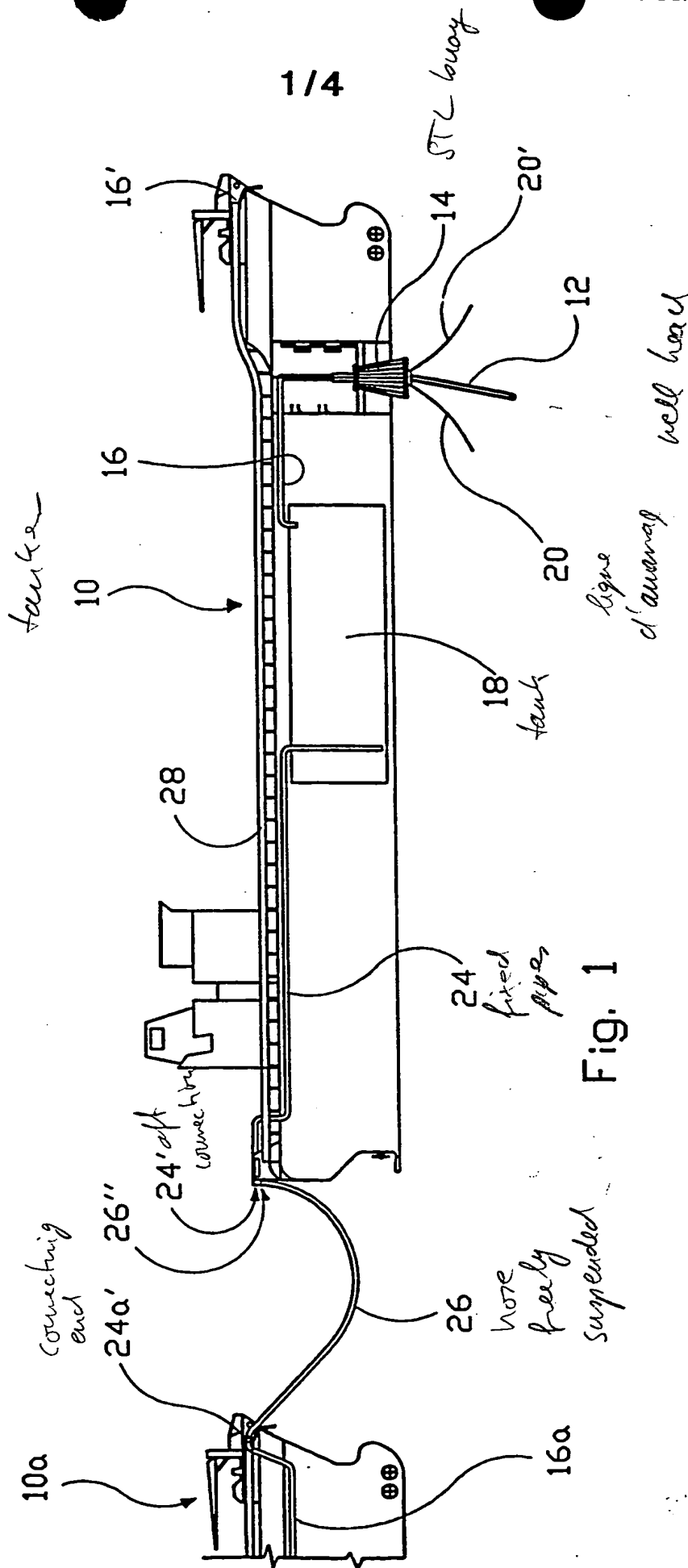
## C L A I M S

1. A device by a tanker provided with at least one storage tank (18) for the temporary storing of oil or other liquid, and with an oil/liquid transfer system (16,24,26) to enable  
5 transfer of oil or other liquid from/to the tanker to/from for example another tanker (10a), or an installation, in which said oil/liquid transfer, for example between two tankers (10, 10a), may be effected via the stern of the former tanker (10) to the other tanker, or via the bows of the former  
10 tanker (10) and the other tanker (10a) by means of a transfer hose (26), characterized in that the former tanker (10) has said transfer hose (26) arranged thereto, which transfer hose (26) in the extended essentially straight stand-by position preferably extends along one side  
15 of the ship's hull, and is supported displaceable from said stand-by position, in opposite directions along its own longitudinal axis.

2. A device according to claim 1, characterized in that in its stand-by position the transfer hose (26) is  
20 placed in a trough 28.

3. A device according to claim 2, characterized in that the trough (28), besides the longitudinal portion which is occupied by the transfer hose (26) in the stand-by position, has an extension which is terminated (28') close to  
25 the bows of the ship (10) and a trough extension which is terminated (28'') close to the stern of the ship (10).

4. A device according to claim 1, characterized in that the transfer hose (26) is placed on rollers, perhaps a conveyor belt, on which it can be moved towards the  
30 stern/bows whenever it is to be used.



2/4

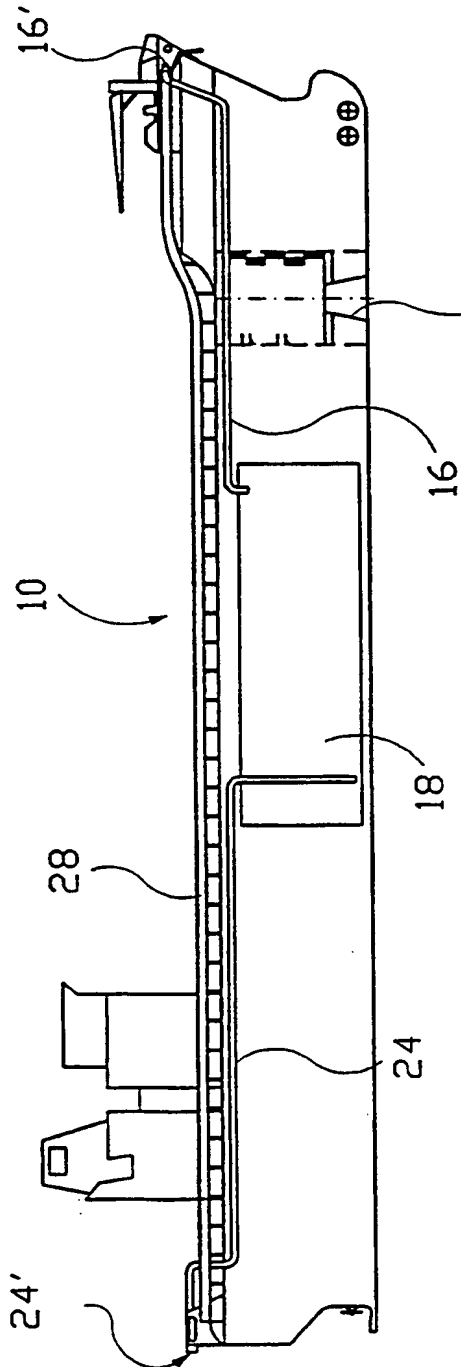


Fig. 2

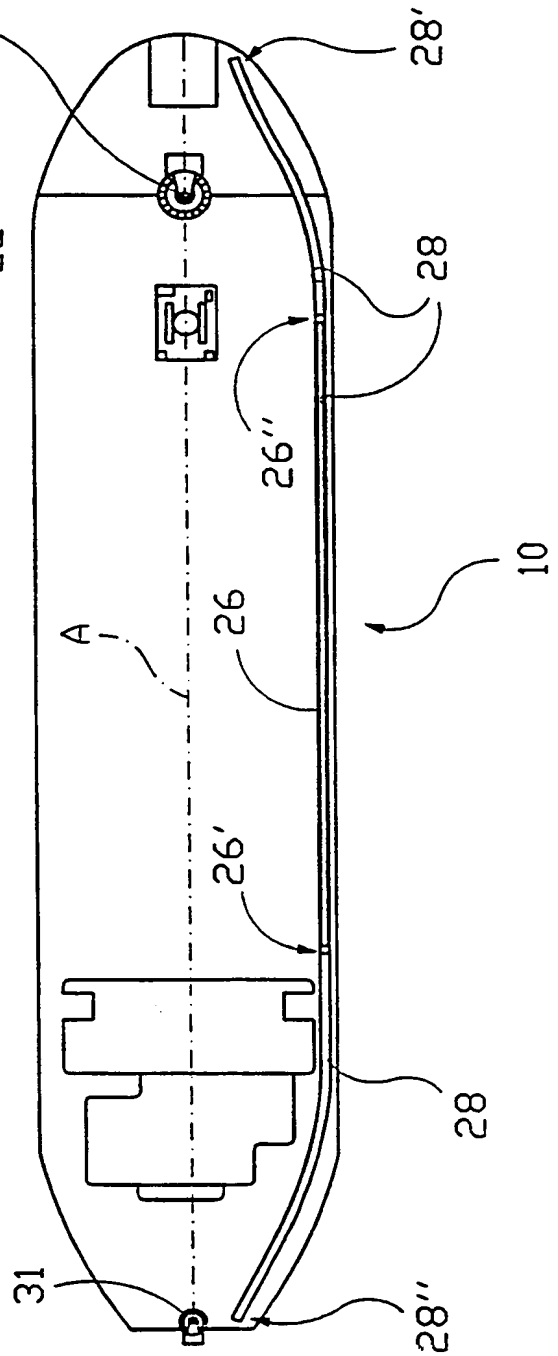


Fig. 3

3/4

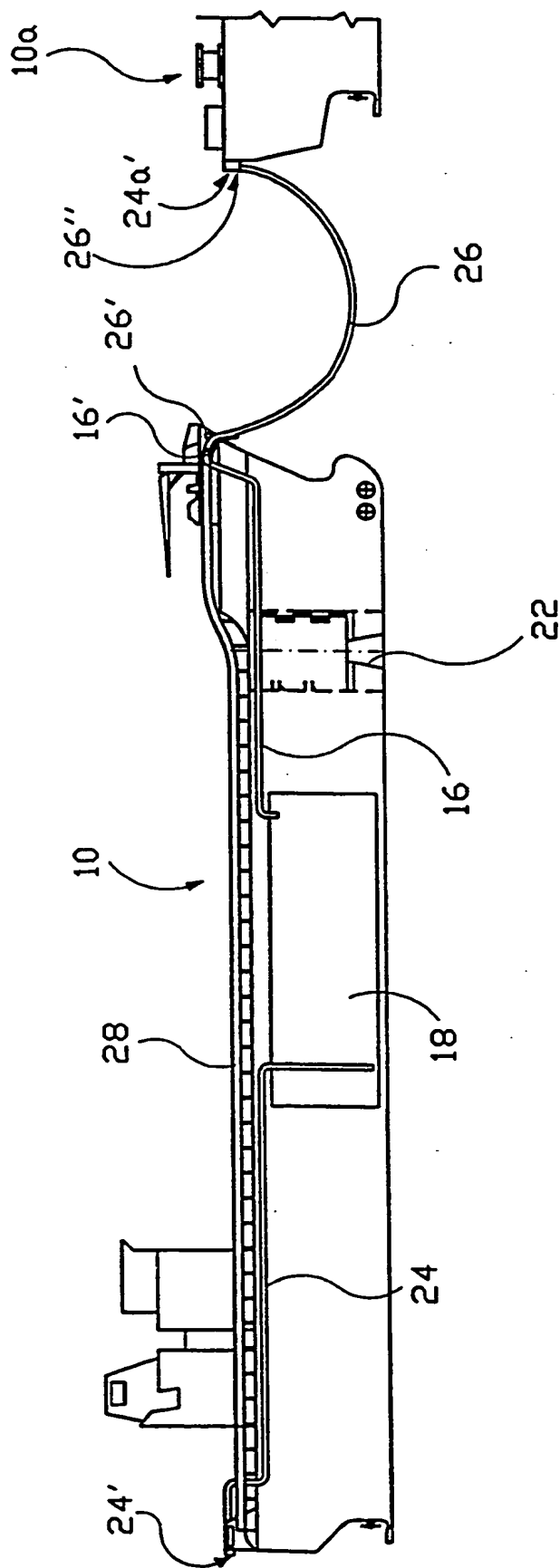
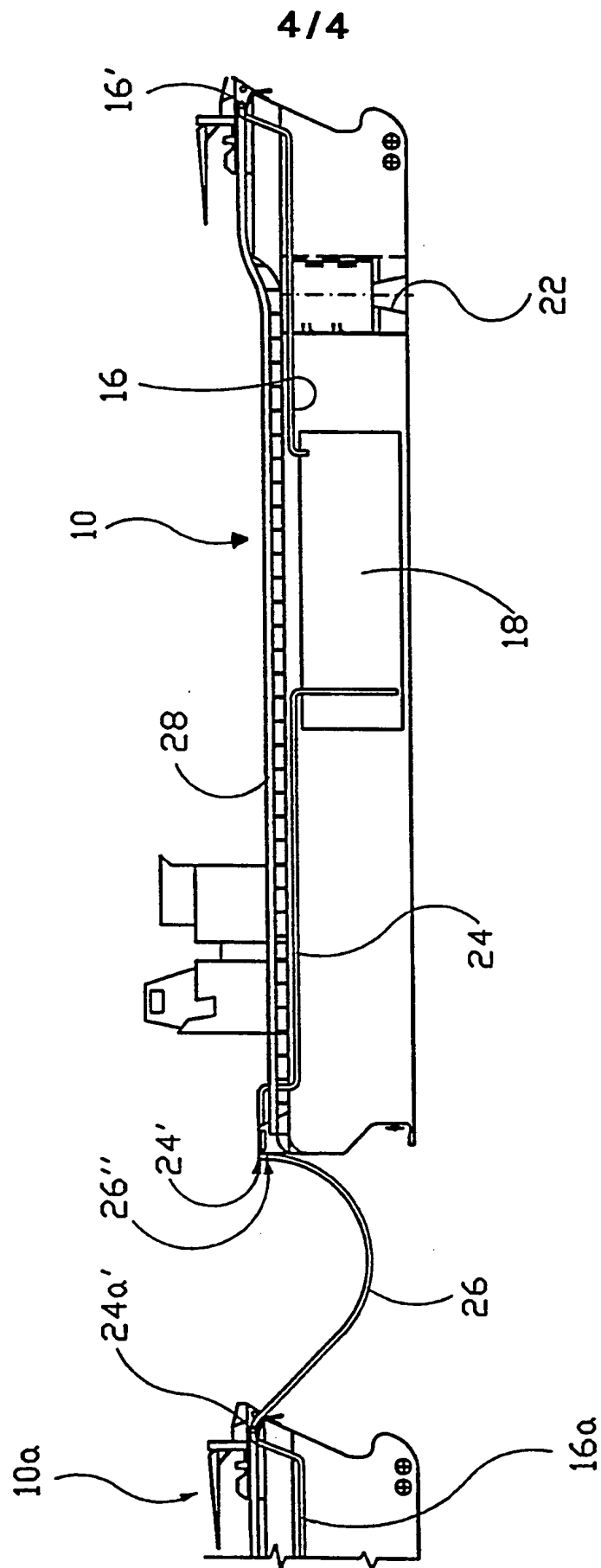


Fig. 4



5. 9. 1951

## INTERNATIONAL SEARCH REPORT

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## C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
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A	US 3766938 A (F.H. STRACKE ET AL), 23 October 1973 (23.10.73)  -- -----	1-4

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## A. CLASSIFICATION OF SUBJECT MATTER

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Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 3833032 A (W.R. HNOT), 3 Sept 1974 (03.09.74), column 3, line 55 - column 4, line 5, figures 1-4, abstract --	1-4
X	US 4064820 A (C. VOGT), 27 December 1977 (27.12.77), column 1, line 23 - line 47, figures 1-4, abstract --	1-4
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